Australian Government

MEM48021 Apply metallurgical principles and techniques in welding and other thermal processes

Release: 1

MEM48021 Apply metallurgical principles and techniques in welding and other thermal processes

Modification History

Release 1. Supersedes and is equivalent to MSATCM510A Apply metallurgical principles and techniques in welding and other thermal processes.

Application

This unit of competency defines the skills and knowledge required to apply metallurgical principles and techniques to welding applications as a member of a design and development team or similar in support of the design and development of welding and other thermal practices in mechanical and manufacturing applications.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

MEM09229 Read and interpret technical engineering drawings
MEM30007 Select common engineering materials
MEM48011 Apply basic chemical principles to metallurgy
MEM48012 Calculate and predict chemical outcomes in metallurgical situations
MEM48016 Select metal joining process

Competency Field

Metallurgy

Elements and Performance Criteria

Elements	**Performance Criteria**
Elements describe the essential *outcomes.*	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Determine job requirements	1.1 Follow standard operating procedures (SOPs) 1.2 Comply with work health and safety (WHS) requirements at all times 1.3 Undertake consultations and briefings with managers, employers and customers to determine welding application requiring metallurgical specification and analysis
2. Select welding or thermal process	2.1 Conduct consultations, briefings and research to determine welding

Elements	Performance Criteria
Elements describe the essential *outcomes.*	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
principles and techniques	application, metallurgical specification and analysis required 2.2 Select relevant welding and thermal cutting techniques, principles and associated technologies for application
3. Undertake welding and thermal process analysis and specify welding or other thermal process solutions	3.1 Apply relevant scientific principles in a consistent and appropriate manner to obtain the required welding or thermal process solution 3.2 Use appropriate calculations and coherent units in the solution of engineering calculations 3.3 Use significant figures in engineering calculations 3.4 Apply techniques and associated technologies, software and hardware to obtain the required welding or thermal process solutions 3.5 Report analysis results and recommend welding or thermal process solution

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.	
Sources of information include one or more of the following:	• reference standards and texts • manufacturer catalogues and industrial magazines • websites • phone information gathering • email information gathering.
Welding defects include:	• shape defects including: • excess weld metal • overlap • undercut

	• lack of fusion and penetration including: • incomplete root penetration • lack of root fusion • lack of interrun fusion • lack of side wall fusion • inclusions including: • linear • isolated • oxides • gas porosity including: • worm hole • uniform • restart • surface • solidification porosity including: • crater pipe • shrinkage porosity • solidification cracking including: • hot cracking • lamellar tearing • weldability of aluminium and its alloys including: • inherent problems including: • hydrogen porosity • oxide • their prevention • hot cracking including: • causes • alloys susceptible • alloys resistant • filler metals • weldability of carbon and low steels and the welding zones of steel including: • identification and microstructures • relation to the iron or iron carbide equilibrium diagram • multi-run welds • cold cracking including: • effects of hydrogen • martensite • stress • austenitic stainless steels including: • hot cracking • corrosion

	• intergranular corrosion • heat affected zone precipitation • carbide stabilisers • extra low carbon stainless.
Other thermal processes include one or more of the following cutting, gouging, shaping or local treatment processes:	• oxyacetylene • oxyhydrogen • plasma • carbon arc.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MSATCM510A Apply metallurgical principles and techniques in welding and other thermal processes.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2